



Frito-Lay, Inc.

# TAT Workshop

*January 7, 2003*

# Frito-Lay Background



Frito-Lay, Inc.

*The Packaged Foods Division Of PepsiCo*



- Over \$12 Billion In Annual Revenue
- Over \$100 Million Energy & Utility Spend
  - Natural Gas & Alternative Fuels
  - Electricity
  - Water & Wastewater
- 45 Manufacturing Sites, 200 Distribution Centers

# Big Hairy Audacious Goals



Frito-Lay, Inc.

*Incremental Efficiency Gains Are Not Sufficient*

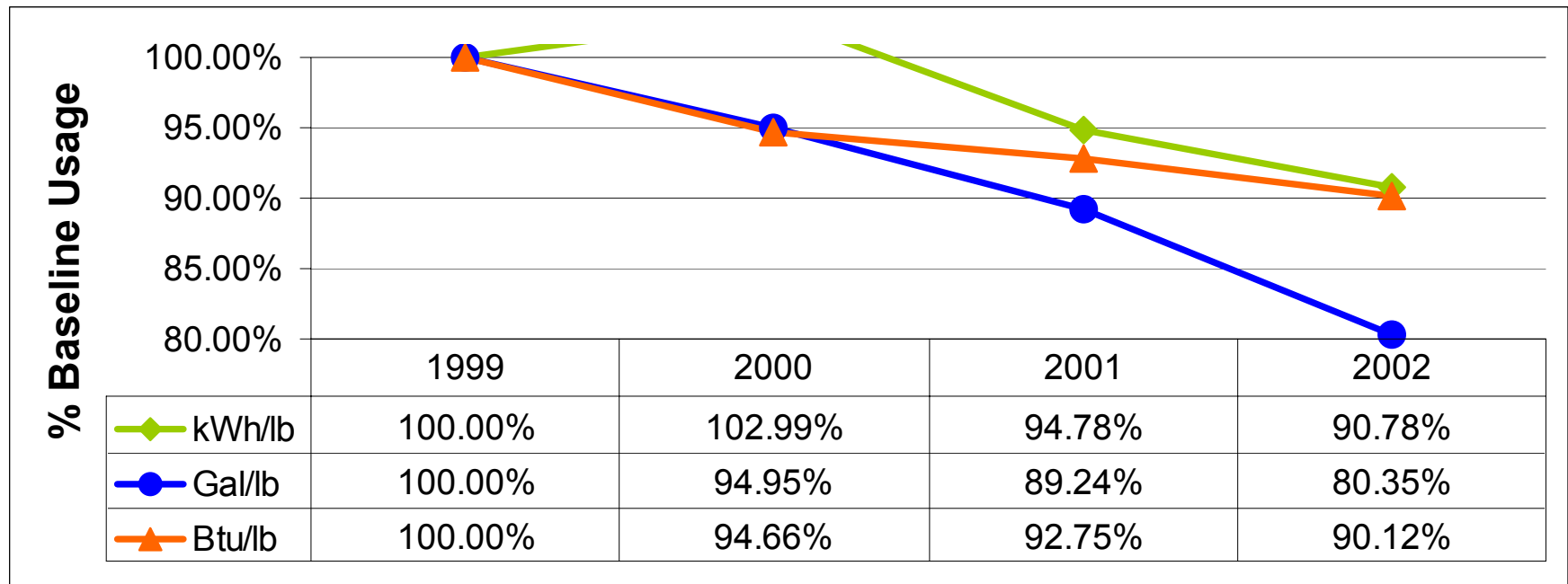
- 5-10% Efficiency Gap With Installed Technology
- Limited Rate Opportunities
- Big Hairy Audacious Goals - Change The Physics!
  - 50% Reduction In Water Usage Per Pound
  - 30% Reduction In Thermal Fuels
  - 25% Reduction In Electricity
- Five Year Plan To Significant Productivity Goals

# Tracking Progress



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*Performance Against BHAGs Has Been Steady*



- Greatest Progress in Water Reduction - 20%
- Steady Progress in Fuels Reduction - 10%
- Electric Reduction Despite Increased Automation - 10%

# Heat Recovery Focus



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*Get The Most Out of Every Btu!*

- Stack Analysis
  - Types of Stacks
  - Available Heat
  - Stack Conditions
- Use Options
  - Hot Water
  - Electric Generation
  - Cooling
- Design Hurdles

# Stack Analysis



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*We Have An Abundance of Low-Grade Heat Sources*

- Frito-Lay Stack Types
  - Fryers - Potato Chip (PC), Tortilla Chip (TC), Corn Chip (FCC)
  - Ovens - Toast Ovens, Pretzel Ovens, Baked Products
- Waste Heat Available
  - PC - 6 - 17MMBtu/Hr (Depending on Model)
  - CC - 0.5 - 1.0MMBtu/Hr
  - Ovens - 2.5 - 3.0MMBtu/Hr
- Typical Stack Conditions
  - Temperature - 225F to 250F
  - Composition - Steam
  - Contaminants - Oil Particles, Oil Vapor, Air

# Uses For Recovered Heat



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*Finding Uses For Recovered Heat Is Challenging*

- Hot Water
  - Process Pre-Heating
  - Building Heat
  - Sanitation
- Electricity Generation
  - Organic Rankine Cycle
  - Potentially 400 kW
- Cooling
  - Absorption
  - Adsorption

# Design Hurdles



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*These Issues Need To Be Overcome*

- Capital Cost
  - Heat Recovery Mechanism
  - Piping Changes
  - Air Handler Changes
- Insufficient Heat Sink
  - Seasonal Building Load
  - Process Limitations
  - Incongruous Sanitation Cycle
- Water Reclamation
  - High Wastewater Costs Impair Savings





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# Questions, Comments & New Ideas Welcomed

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